

**Key Recommendations
From Independent Science Advisors
Concerning Non-aquatic Resources
In the BDCP Plan Area**

Prepared by Wayne Spencer

1 Introduction

This handout briefly summarizes recommendations from a group of independent science advisors (ISA) concerning the treatment of non-aquatic species and communities by the Bay Delta Conservation Plan (BDCP). Six advisors¹ having expertise with terrestrial and wetland ecology and species reviewed various BDCP documents and convened a workshop on September 30, 2008, to discuss plan documents and to develop recommendations to be considered by plan participants.

Our discussions recognized the urgency of the plan's focus on listed aquatic species. We therefore framed our recommendations concerning non-aquatic species with a goal of refining and supplementing potential conservation measures for aquatic species to also benefit non-aquatic species and communities.

The intent of the ISA process is to ensure that the plan has access to the best available science. Our recommendations are not binding, and are not intended to either question or promote particular plan goals or policies.

2 Covered Species

Advisors reviewed the consultants' evaluation and list of potentially covered species. In general, we recommend erring on the side of caution in the face of uncertainties about potential plan effects on rare or imperiled species. We therefore recommend maintaining a relatively comprehensive list of species, and winnowing the list as uncertainties are reduced and it becomes clear that certain species are unlikely to be affected by plan actions. We also recommend that all California Species of Special Concern (SSC)² be treated as if they could become listed during the plan's permit duration.

2.1 Potential Additions

We recommend adding or retaining the following species or subspecies on a comprehensive list to be considered for coverage:

¹ Peggy Fiedler, WSP Environment & Energy; Marcel Holyoak, UC Davis; Geoffrey Geupel, PRBO Conservation Science; Patrick Kelly, CSU Stanislaus; Wayne Spencer, Conservation Biology Institute; Glenn Wylie, USGS.

² California Species of Special Concern meet some or all criteria for California Threatened or Endangered status. Placing species on the SSC list is intended to help prevent the need to list them by encouraging conservation and recovery actions (Shuford and Gardali 2008).

- **Riparian woodrat** (*Neotoma fuscipes riparia*). This Endangered species occurs just outside the plan boundaries and may occur in the plan area. We recommend awaiting results of surveys currently being performed by the Endangered Species Recovery Program (ESRP) in the BDCP area before determining whether to pursue coverage.
- **Northern harrier** (*Circus cyaneus*) is a California Bird SSC that is declining in the Central Valley due to habitat loss, intensified agricultural practices, and increases in nonnative predators. BDCP conservation measures could adversely affect a small number of harriers.
- **Lesser sandhill crane** (*Grus canadensis canadensis*). This recent addition to the California SSC list winters in large numbers within the Delta. Like the greater sandhill crane (which was included as potentially covered in the consultant's evaluation) the greatest threats to the subspecies are changes in agricultural practices and habitat loss.
- **Least Bell's vireo** (*Vireo belli pusillus*). This Endangered songbird was restricted to a few small populations in southern California at the time of listing (in the 1980s), but it has since been increasing in population and expanding northward within its historic range in the Central Valley. Experts consider it likely to re-occupy riparian habitats in the BDCP area in the near future.
- **Yellow warbler** (*Dendroica petechia*) is a California SSC that has declined significantly in the Central Valley and may be close to extirpation. Possible breeding records in Contra Costa County and a new expanding population on the San Joaquin River NWR suggests high potential for this species to return to riparian habitats in the delta.
- **Modesto song sparrow** (*Melospiza melodia*, "Modesto Population") was considered a valid subspecies (*M. m. mailliardi*) until 2001 (Patten 2001), and may be again under additional taxonomic research (Gardali 2008). Regardless of ultimate taxonomic status, the "Modesto population" of the song sparrow is a California SSC with a high population density in the Bay Delta.
- **Western pond turtle** (*Clemmys marmorata*) is a California SSC found in freshwater sloughs and marshes in the Delta. Salt-water intrusion or other changes due to hydrological shifts in the Delta could affect local populations.
- **California tiger salamander** (*Ambystoma californiense*) is a Threatened species with recent sightings in vernal pool habitats on the western edge of the plan area. Actions there, such as a western around-Delta conveyance, could adversely affect the species and designated Critical Habitat.
- **California red-legged frog** (*Rana aurora draytonii*) is a Threatened species known to occur in the plan area. The advisors are unclear how the consultants' evaluation determined that the species is unlikely to be affected by plan actions, given that covered actions and conservation measures have not yet been fully defined and that surveys sometimes find this species in unexpected locations.
- **California black walnut** (*Juglans hindsii*) is a CNPS list 1B.1 species (seriously endangered in California) and advisors believe it has potential to be listed as Threatened or Endangered. Although it has been widely planted and used for root stock, natural occurrences are extremely rare. We recommend considering covered status for this species if natural populations occur in the plan area that could be affected by covered actions.

- **Bristly sedge** (*Carex comosa*) is a wetland plant with a small potential to be listed. We therefore agree with the consultants “undetermined” finding and suggest keeping this species on the list until uncertainty is reduced.
- **Various plant species** found in vernal pools, swales, or flats that could be adversely affected by plan actions, especially in combination with climate change, or have the potential to benefit from the plan’s conservation actions. We believe they should be retained until uncertainties about potential plan effects are resolved.
 - Bogg’s Lake hedge-hyssop (*Gratiola heterosepala*)
 - San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)
 - Heartscale (*Atriplex cordulata*)
 - Brittscale (*Atriplex depressa*)
 - Vernal pool smallscale (*Atriplex persistens*)
 - Round-leaved filaree (*Erodium macrophyllum*)
 - Fragrant fritillary (*Fritillaria liliacea*)
 - Lesser saltscale (*Atriplex minuscula*)

We agree with the consultant’s evaluation that the following species, which are associated with the extremely rare Antioch Dune community, are unlikely to be directly affected by BDCP covered actions or conservation measures. However, due to the extreme rarity and conservation value of this community, we recommend evaluating whether BDCP implementation could contribute to the recovery of these species or whether BDCP implementation might indirectly constrain potential conservation and recovery actions for them by other plans or entities.

- **Delta green ground beetle** (*Elaphrus viridis*)
- **Lange's metalmark butterfly** (*Apodemia mormo langei*)
- **Antioch Dunes evening primrose** (*Oenothera deltoides* ssp. *howelli*)
- **Contra Costa wallflower** (*Erysimum capitatum* spp. *angustatum*)

2.2 Potential Deletions

Due to uncertainties for one or more of the evaluation criteria, the consultants’ draft evaluation found that whether the following species should be considered for coverage was “undetermined.” The advisors believe that these species are unlikely to require coverage, and they could be deleted from the list.

- **Snowy plover** (*Charadrius alexandrinus*, interior population). Breeding records in the vicinity of BDCP are exceedingly rare and restricted to agricultural evaporation ponds, sewage treatment ponds, and alkali playas. Although nesting occurred at the Yolo Bypass Wildlife Area in 1998 and 2006, advisors believe that BDCP is unlikely to affect this species.
- **Coast horned lizard** (*Phrynosoma coronatum*) does not likely inhabit the plan area or areas likely to be affected by around-Delta conveyances.

- **Caper-fruited tropidocarpum** (*Tropidocarpum capparideum*). Although this species historically occurred in the plan area, it has not been re-located in the plan area in recent years and is presumed extirpated.

2.3 Planning Species

Some conservation plans designate planning species that are relatively easy to monitor as indicators of environmental attributes important to less-easily monitored covered species or to overall ecological integrity. The advisors recommend considering whether the covered species list should be supplemented with additional planning species that are indicative of key ecological conditions, processes, and communities that are not sufficiently addressed by the covered species or that may serve as reliable indicators of habitat condition for covered species. Examples could include tree swallows (*Tachycineta bicolor*) or spotted sandpipers (*Actitis macularia*), which are indicators of healthy floodplain environments, diverse aquatic insect communities (important food for covered fish), and fish breeding habitat (gravel bars).

We also recommend considering nonnative or invasive species as planning species for monitoring and management purposes. For example, *Lepidium* is a highly invasive weed of wetland margins; and black rats (*Rattus rattus*), which are pervasive in Central Valley riparian areas, appear to adversely affect riparian woodrat populations.

3 Covered Communities

Due to the BDCP's focus on conserving imperiled fish species, the plan currently includes three "covered communities" that support or contribute to fish populations and seven "other communities." We recommend considering whether the plan should add more covered communities, or treat all communities in the plan area as potentially covered, in recognition of the interdependences among ecological communities within an ecosystem. We point out that (1) many of the potentially covered species are found in the "other communities," (2) some of the rarest communities in the plan area are disproportionately vital to imperiled species, such as inland dune scrub and seasonal wetlands, and (3) community types are interdependent in complex ways and should not be treated in isolation of one another. Even if all communities in the plan area are not treated as covered communities, the advisors at least recommend describing and assessing all communities within the plan area with a comparable level of detail and care, and describing community interdependencies in an ecosystem context.

We further recommend that analysis and documentation of plan effects continue recognizing the finer vegetation associations and habitat conditions that exist within these broadly defined natural community types³. For example, the category "natural seasonal wetlands" includes diverse types of seasonal wetlands, from vernal pools to alkali flats, which differ tremendously in ecological conditions and in the suite of covered species each supports.

³ Community types were defined based on the CALFED Bay-Delta Program Ecosystem Restoration Program Volume 1 and Multiple Species Conservation Strategy (CALFED 2000), which defined 18 "broad" natural communities, while recognizing that there are finer habitat types and vegetation associations within each community. The Draft Existing Ecological Conditions chapter we reviewed rightfully acknowledged these finer distinctions and supplied cross-walk tables of the various plant associations and alliances.

Communities need to be considered not just in isolation but as interdependent collections of species that affect one another within mosaics and across gradients. Naturally connected and transitioning communities along elevation and moisture gradients will (1) benefit the covered fish species, (2) provide more natural habitat mosaics to support terrestrial and wetland species, and (3) create more sustainable conditions during climate change and sea-level rise.

4 Plan Documents

In general, the advisors were impressed with the quality of documents and maps we reviewed. The following general comments are intended to improve what already appear to be thoroughly researched and thoughtfully prepared information products.

4.1 Draft Existing Ecological Conditions Chapter

We recommend that the existing ecological conditions chapter begin with a broader treatment of the Bay-Delta ecosystem, natural communities, and processes, including those important to non-aquatic species. All communities in the study area should be described to a similar level of detail as the three covered communities.

The draft document does a good job of describing the broad suite of physical, chemical, and biological processes occurring within the project area and covered communities. However, we recommend describing how community types are arranged or interconnected in spatial mosaics, and characterizing patterns of adjacency and intergradation among community types under current conditions versus desired conditions. Current conditions include extensive, unnaturally abrupt boundaries between communities due to levees, dikes, roads, ditches, and engineered channels. More natural transitions along environmental gradients would support more diverse and robust populations of covered species and would make the ecosystem more resilient to changes in water level, hydrodynamics, and climate. Better characterizing current versus desired conditions for habitat mosaics and environmental gradients would help support efforts to select, design, and prioritize conservation measures.

4.2 Species Accounts

The draft species accounts that we reviewed were generally well researched, organized, and accurate. We recommend producing similar accounts for all potentially covered species, with perhaps shorter accounts for those species that were considered but not retained on the potentially covered list.

4.3 Species Habitat Models

We recommend interpreting habitat distribution models for covered species with great caution, recognizing that errors of omission and commission are common and that their extent and frequency are difficult to assess. Statistical models based on species occurrence data are preferable to the GIS overlay approach being used by the consultants, because they reflect the probabilistic nature of species distributions and the level of uncertainty involved in predicting species presence or absence (Guisan and Thuiller 2005). However, we recognize that data are insufficient to build statistical models for most species in the plan area.

4.4 Information Sources

We recommend consulting additional information sources to bolster the scientific foundations of the plan and plan documents, including the following:

- California Riparian Habitat Restoration Handbook (Griggs 2008).
- California Bird Species of Special Concern (Shuford and Gardali 2008).
- Contra Costa County Breeding Bird Atlas (<http://www.flyingemu.com/ccosta/>).
- State Wildlife Action Plan (Bunn et al. 2005).
- Antioch Dunes National Wildlife Refuge Comprehensive Conservation Plan (USFWS 2002).
- Recent climate-change research papers and model results concerning species ranges and phenologies that pertain to the study area and species, such as Loarie et al. (2008).
- ClimateWizard is a climate change modeling and analysis “toolbox” that should be ready for public use soon (<http://faculty.washington.edu/girvetz/ClimateWizard/index.html>).
- PRBO Conservation Sciences has created predictive models of species distribution for 19 different bird species in the Central Valley using a machine-learning algorithm called Maxent (Phillips et al. 2004; <http://data.prbo.org/cadc2/index.php?page=115>).

5 Conservation Measures

The advisors offer some recommendations about how conservation measures under consideration to benefit aquatic communities and species may affect terrestrial communities and species. We also recommend some additional conservation measures specific to non-aquatic resources.

5.1 Conservation Design Principles

We recommend the following general principles be considered during the selection, design, and implementation of conservation measures:

- Plan conservation measures hierarchically, working from ecosystem to community to species-level considerations. Do not plan conservation measures for specific covered species or communities in isolation, without considering their relationships with other species and communities in the broader ecosystem.
- Design reserve or management areas to achieve mosaics of community types within areas large enough to support the most area-dependent covered (or planning) species and desired ecological services, and to accommodate future shifts due to climate change (e.g., sea-level rise, changing runoff patterns, shifting climate “envelopes”).
- Strive for representation of all community types in habitat mosaics well distributed across the Delta, but considering site-specific conditions. Where possible, maintain or create “soft edges” or natural transitions along environmental gradients, as opposed to abrupt transitions or “hard edges” between community types.
- Bigger is better for habitat conservation and restoration sites, but don’t ignore small areas that support rare communities or species. For example, small areas of seasonal wetlands, inland dunes, or alkali flats support disproportionate numbers of imperiled species.

- Seek to preserve and enhance natural heterogeneity in elevation, water depth, flooding frequency, nutrient conditions, vegetation types, and adjacency of different habitat types within and among the conserved, restored, or maintained habitat mosaics.
- Enhance and preserve habitat connectivity where possible to maximize potential for natural range shifts, population expansions, escape from disturbance events (fires, floods), and maintenance of ecological processes, and to avoid isolating small populations of those species having limited dispersal abilities.
- Strive to create self-sustaining systems, but recognize that some communities and species may need active or perpetual management. For example, some invasive, nonnative species may require prolonged control efforts to sustain covered species or communities, and active control of flooding depths, durations, and timing may be required for some resources.

5.2 Recommended Analyses

We recommend the following analyses be performed prior to finalizing the plan's conservation design, to assess likely effects of proposed covered activities and conservation measures on non-aquatic resources, and to inform how best to design and locate covered activities and conservation measures.

- Do an overlay analysis for covered actions and conservation measures with known and potential locations of covered species and communities. This should include an assessment of how changing hydrological regimes overlay onto existing ecological communities and species. Assess how the combination of changes will affect the conservation design principles discussed in section 5.1 (e.g., community representation, habitat patch size, environmental heterogeneity, natural gradients, maintenance of rare communities, and adjacency and connectivity of existing community types within mosaics).
- Assess for each covered species whether natural range shifts or colonization into restored habitat is likely to occur with changing conditions (e.g., hydrological and sea-level changes, restoration actions), or whether translocation/transplantation is required. For species not likely to shift naturally, prioritize avoidance of occupied areas and consider translocation/transplantation plans as part of the adaptive management program.
- Assess the distribution of "hard" vs. "soft" edges and determine where restoration actions can be used to soften edges to accommodate ecological shifts due to changes in hydrodynamics, water-levels, or other factors.
- Use climate envelope models coupled with habitat models (Loarie et al. 2008, Hijmans and Graham 2006, Green et al. 2008) to identify potential effects on covered species over a 50-year horizon. This could inform where offsite conservation actions may be more effective than onsite actions in hedging against climate change for some covered species.

5.3 Locations of Special Concern

The advisors discussed whether there are certain geographic locations in the BDCP plan area that are of particular importance to at-risk species or communities, or to maintaining critical ecological processes. The following are a few key locations where impacts should be avoided or where additional conservation, restoration, and management may be beneficial.

- **Staten Island** is a critical wintering area for sandhill cranes and other birds, due in large part to wildlife-friendly agricultural practices.
- **Franks Tract State Recreation Area.** In addition to its importance to aquatic resources, the marshes of Frank's Tract are a hotspot of bird diversity and support a variety of rare and imperiled species, including California black rail, yellow warbler, yellow-breasted chat, and song sparrow.
- Occupied areas for riparian brush rabbits, including **Stewart Tract**, and near Lathrop. Occupied areas should be better defined by surveys currently underway by ESRP.
- **Antioch Dunes** represent a small remnant of a very rare ecological community that supports numerous endemic and imperiled species (see Sections 2 and 3). Remaining dunes have become isolated by urban development, limiting potential for restoring or expanding habitat.

5.4 Restoration Recommendations

- Recognize that restoration is a process, not a one-time action. We recommend following the restoration process designed by River Partners (Griggs 2008) for riparian and riverine restoration projects.
- Passive riparian restoration (just restoring semi-natural flooding regimes) is unlikely to be effective due to invasive weeds and insufficient colonization by dispersal-limited species. Some planting of woody vegetation, including both understory and overstory plants is recommended (Riparian Habitat Joint Venture 2004). Also, follow-up management to control invasives may be needed for up to 10 years post restoration to ensure success, and translocation may be necessary for some species.
- Design conveyance facilities and structures in a manner that allows for control of water flows and depths to maintain diverse ecological conditions and particular species' needs. Consider assigning a BDCP Work Group or Technical Team to evaluate the range of conditions desired to support the diverse requirements of covered species, communities, and processes in the plan area (terrestrial as well as aquatic). Recognize that optimizing how these metrics can best be manipulated to sustain covered species should be a focus of the systematic adaptive management and monitoring program.
- In locating potential restoration sites, attempt to balance the benefits of enlarging or connecting existing habitat areas with the benefits of spreading sites across broad ecological gradients. Locating habitat restoration areas near existing habitat can help expand or connect species' habitats to facilitate population expansions. Conversely, distributing restoration sites across the plan area will capture broader gradients in ecological conditions and may help spread the risk of restoration failures, maximize habitat diversity, and deal with uncertainties due to climate change and other dynamics.
- For floodplain restoration, consider leaving breached levees at least partially in place to provide physical habitat diversity and serve as refugia for terrestrial species during floods. Revegetate such elevated areas as necessary using local plant palettes to provide escape cover and habitat for diverse species.
- Meandering and dendritic channels are better than straight, undivided, and unbraided channels. Where floodplain areas are to be graded to create proper depths and drainage,

consider leaving some permanent aquatic habitat (slightly deeper channels) to provide habitat for giant garter snakes, so long as these are configured to prevent fish stranding.

- Strive to create natural combinations of habitat types in mosaics that transition along physical gradients, rather than restoring single community types in isolation. For example, where tidal emergent marsh restoration is planned, also restore adjacent transitional and upland vegetation communities moving up the elevation gradient.
- Use restoration to increase the rarest habitat types, if feasible, including seasonal wetlands and dune communities. Although vernal pool creation is controversial as a mitigation measure, there may be opportunities for enhancing or restoring degraded or former vernal pool areas. However, offsite conservation of intact vernal pool systems may be preferable to attempting to create or restore vernal pools within the plan area. Although we do not anticipate direct negative plan effects on inland dune communities, BDCP actions have potential to create opportunities for restoring dune communities in some locations, perhaps to be implemented by other entities or plans.
- Use restoration to create “soft edges” between habitat types along ecological gradients. Some potentially covered plant species occupy narrow bands of conditions along the elevation-tidal gradient, and many currently experience sharp transitions due to dikes, levees, or other artificial features. Where possible, restoration should be used to soften such edges via grading and/or revegetation to create opportunities for gradual range shifts and other adjustments to changing conditions.

5.5 Species-specific Conservation Actions

The advisors do not recommend relying on species-specific mitigation actions or structures—such as artificial burrows or nest boxes—as *primary* conservation tools. Conservation, maintenance, and restoration of intact habitat mosaics and ecological communities must be primary. However, the following specific mitigation measures should be considered as supplements to primary conservation and management measures, particularly where covered species face specific life-requisite deficits:

- **Artificial burrows** are sometimes used by nesting burrowing owls, but have not been shown to increase owl populations in the long term. Nevertheless, artificial burrows may be beneficial in certain situations where natural burrows are limiting.
- **“Bunny mounds,”** or areas of ground elevated above the highest expected flood levels, are important in floodplain habitats to allow for escape by riparian brush rabbits and other species during floods and to create habitat heterogeneity for diverse species. Because creating mounds from scratch can be expensive (especially if it requires importing fill) look for opportunities to get “free” bunny mounds, such as by leaving portions of old levees in place when breaching them for floodplain restoration. Mounds should be revegetated with appropriate trees and shrubs, if not already sufficiently vegetated.
- **Nesting islands.** Creating or leaving some higher ground within subtidal and intertidal restoration areas can provide nesting islands for some shorebirds as part of an overall heterogeneity strategy.

- **Brown-headed cowbird trapping** (following guidelines of the North American Cowbird Advisory Council <http://cowbird.lscf.ucsb.edu/>) can benefit populations of songbirds that are adversely affected by cowbird nest parasitism, such as least Bell's vireo and yellow warbler.
- **Contaminant control**, including control of herbicides, rodenticides, and light pollution may be an important management measure in conservation areas.
- **Vegetation management** on levees. We do not recommend burning, mowing, or herbicide use to control vegetation on levees.
- **Feral cat control** may be necessary in conservation areas or other areas important to covered species. Restrictions on maintaining feral or free-roaming cat populations should be enforced throughout the plan area.

6 Literature Cited

- Bunn, D., A. Mummert, R. Anderson, K. Gilardi, M. Hoshovsky, S. Shanks, K. Stahle, and K. Kriese. 2005. California wildlife: Conservation challenges (comprehensive wildlife conservation strategy). A report of the California Department of Fish and Game. Prepared by The Wildlife Diversity Project, Wildlife Health Center, University of California, Davis. 496pp.
- CALFED Bay-Delta Program. 2000. Multi-Species Conservation Strategy, Final Programmatic EIS/EIR, Final. July 2000. Available at:
http://www.calwater.ca.gov/calfed/library/library_archive_EIS.html.
- Gardali, T. 2008. Song sparrow. Pages 400-404 in Shuford, W. D. and Gardali, T., editors. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
- Green, R.E., Y.C. Collingham, S.G. Willis, R.D. Gregory, K.W. Smith, and B. Huntley. 2008. Performance of climate envelope models in retrodicting recent changes in bird population size from observed climatic change. *Biology Letters* 4:599-602.
- Griggs, F.T. 2008. California riparian habitat restoration handbook. California Riparian Habitat Joint Venture. http://www.riverpartners.org/reports-and-articles/Restoration_Handbook_FINAL.pdf
- Guisan, A., and W. Thuiller. 2005. Predicting species distribution: offering more than simple habitat models. *Ecology Letters* 8:993-1009.
- Hijmans, R.J., and C.H. Graham. 2006. The ability of climate envelope models to predict the effect of climate change on species distributions. *Global Change Biology* 12:2272-2281.
- Loarie, S.R., B.E. Carter, K. Hayhoe, S. McMahon, R. Moe, C.A. Knight, and D.D. Ackerly. 2008. Climate change and the future of California's endemic flora. *PLoS ONE* 3(6):e2502. www.plosone.org
- Patten, M.A. 2001. The roles of habitat and signaling in speciation: Evidence from a contact zone to two song sparrow (*Melospiza melodia*) subspecies. Ph.D. Dissertation, University of California, Riverside.

- Phillips, S.J., M. Dudik, and R.E. Shapire. 2004. A maximum entropy approach to species distribution modeling. Proceedings of the 21st International Conference on Machine Learning, Banff, Canada, 2004.
- Riparian Habitat Joint Venture. 2004. Version 2.0. The riparian bird conservation plan: A strategy for reversing the decline of riparian-associated birds in California. Calif. Partners in Flight (www.prbo.org/calpif/plans.html).
- Shuford, W.D. and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
- U.S. Fish & Wildlife Service. 2002. Antioch Dunes National Wildlife Refuge Comprehensive Conservation Plan. U.S. Fish & Wildlife Service, California/Nevada Refuge Planning Office, Sacramento, CA.